U S NAVY RESPONSES TO U S EPA COMMENTS TO DRAFT FINAL REMEDIAL INVESTIGATION BUILDING 81 NAS BRUNSWICK ME
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NAVY RESPONSES TO U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) COMMENTS (DATED SEPTEMBER 1, 2011) DRAFT FINAL RI, BUILDING 81 FORMER NAVAL AIR STATION (NAS) SOUTH WEYMOUTH, MASSACHUSETTS

Navy's responses to the EPA comments on the Navy's June 20, 2011 Responses to Comments (RTCs) on the Draft Final RI for Building 81 are presented below. The EPA comments are presented first (in italics) followed by Navy's responses.

General Comment *– Please identify whether any of the 2010 RSLs used in the draft document are different than those in the most recent version (May 2011). No changes are needed if the RSLs are up-to-date. If there have been changes, please update the tales and revised wherever appropriate in the discussion of results and conclusions.*

Response: The December 2010 draft final RI included a new human health risk assessment (HHRA) that used the May 2010 EPA RSLs for residential soil and the May 2010 EPA tap water RSLs. Risk-based vapor intrusion screening levels were calculated using EPA toxicity criteria (presented on the May 2010 RSL table). The Navy cannot be expected to substantially revise a draft final document whenever EPA RSLs are updated. The RSLs in the HHRA are fixed at May 2010, which were the most recent criteria available when the risk assessment for the Building 81 draft final RI was performed.

The draft final RI nature and extent section was supplemented with new groundwater data but no new soil data. The Section 4.3 discussion of the nature and extent of contamination in soil states that the screening criteria included the 2004 EPA Region 9 Preliminary Remediation Goals (PRGs), ecological risk-based benchmarks, and Base background soil concentrations and notes that the HHRA used the May 2010 RSLs. The Section 4.4 discussion of the nature and extent of contamination in groundwater states that the screening criteria included Region 9 PRGs as well as 2007 federal and state maximum contaminant levels (MCLs) and Base background values and notes that the HHRA used the May 2010 RSLs. Soil vapor samples were collected in 2009 and screened against the 2010 EPA Risk Screening Level (RSL) using an attenuation factor of 10 and notes that the HHRA used the May 2010 RSLs.

As described above, the draft final RI used the RSLs that were available at the time. However, for comparative purposes only, Table 1 attached to these RTCs documents the changes between the May 2010 and June 2011 RSLs.

Comment 1: *While EPA still believes that the site characterization is sufficient to proceed to the FS, further review of existing data suggests that several longstanding issues will require additional evaluation via subsequent phases of work, including the FS and supplemental characterization planned by a third party as discussed at the site meeting of August 18, 2011. Relevant issues include the following;*

a) *Potential for unconstrained ground water flow/contamination transport to the south, southwest and southeast beyond the limits of the Building 81 monitoring network; EPA has consistently voiced this concern in formal and informal comments for many years. While the most recent characterization efforts presented in the Draft final RI did much to improve the plume delineation to the west and northwest, the potential for southerly ground water flow and contaminant transport remains a significant concern.*
b) *Potential linkages between Building 81, Buildings 15 and 40, and Building 82, particularly with respect to bedrock ground water flow; This issue has been discussed at many meetings, mostly in conjunction with the Building 82 RI/FS. However, a concrete plan to address this issue, which transcends the artificial administrative boundaries of the various sites, still needs to be formally presented by the Navy. As EPA has commented previously, it is likely that the current monitoring network in the greater Building 81/15/40/82 area will need to be augmented and a comprehensive long-term monitoring strategy which includes all of the sites will need to be developed.*
c) *Role of surface utilities in groundwater flow and contaminant transport; The massive subsurface utility corridors along Shea Memorial drive need to be more comprehensively investigated. It is*

likely that these features are influencing transport of contaminants in the groundwater and/or vapor phases. Similarly, the role of buried utilities north and south of the former building 81 need to be examined more closely for similar reasons

d) *Robustness of the soil-gas sampling effort to date; While the soil gas sampling conducted for the Draft Final RI report is informative, it is not clear that it represents a worse-case scenario for a number of technical reasons. Specific issues are highlighted in comments below. It is recommended that a technical meeting on the subject is held prior to finalization of future soil gas sampling efforts so that a technical consensus may be reached on methodologies which may supplement the information collected to date.*

Response: The Navy agrees with EPA that the RI site characterization is sufficient and plans to finalize the RI and proceed with the FS. Responses to Comment 1 are discussed in separate subsections below.

a. The groundwater concentrations in the overburden are well constrained by the groundwater profiling points south of the source area as well as by data from permanent monitoring wells. Additional overburden wells south, southeast, and southwest of the plume were installed during the supplemental fieldwork in 2009 and include MW-44S through MW-46S. Water level measurements in the shallow bedrock indicate that the gradient is consistently to the west, as shown in Figure 3-30 (most recent data) of the draft final RI. The MW-50B (well installed in 2009) PCE concentration is less than 1 µg/L, and intercepts groundwater flow from the source area. The groundwater PCE and TCE plumes in the deep bedrock have a significantly smaller lateral extent. Concentrations are well constrained in the deep bedrock with the exception of the area south of MW-35D.

During the remedial design phase of work and development of the monitoring program, the Navy will consider additional wells to further refine plume delineation, and address the potential for groundwater flow and hence contaminant transport in a southerly direction. In addition, the Navy will consider the information from studies completed by EPA and USGS and Arcadis, as part of the SSTTDC/LNR due diligence work.

b. The Navy has previously suggested developing a combined long-term monitoring program for Buildings 81 and 82, and has agreed that additional wells would be installed as part of the monitoring program associated with the selected remedies for the two sites. This monitoring program will be developed during the remedial design phase. The sites in question have different and well delineated sources. The long-term monitoring program will include wells (both existing and new) upgradient, cross-gradient, and downgradient of the plumes and will include sufficient well coverage (whether those wells are administratively considered to be part of Building 81 or another site) to evaluate concentrations and groundwater flow for the groundwater plumes.

c. As part of the effort to develop a more complete site conceptual model, the Navy investigated the role of the underground utilities in groundwater flow and contaminant transport. In 2006, utility drawings were reviewed, utility locations were confirmed using ground penetrating radar, and groundwater profiling was performed. The deepest utilities include the storm drain (approximately 8 to 10 feet below grade) and the communication man ways (approximately 10 feet below grade) at the corner of Redfield Road and Shea Memorial Drive. In 2009, additional wells were installed for several purposes, including determining if preferential pathways for migration of dissolved phase contamination potentially exist north, south, and west of the former Building 81 slab. In the water table interval, primary COC (PCE, TCE, and benzene) detections were all below 1 µg/L surrounding the source area and in the immediate vicinity of the utility lines described. This suggests that either contamination has not reached the majority of the utilities in the shallow overburden or the utility lines are not influencing the transport of contaminants in groundwater. At MW-43S, a low level of PCE (less than 1 µg/L) was detected in the shallow overburden northwest of the source area and the storm drain line. Based on this finding, the utility line does not appear to have influenced/redirected the transport of contaminants in this direction. The deep overburden was also investigated in support of the RI. Elevated PCE concentrations were detected in the deep overburden, but groundwater samples were collected below the depth of the utilities. During the remedial design phase of work and development of the monitoring program, the Navy will consider further investigation to determine if there is a preferential pathway toward Building 15 or if in fact the utility lines have influenced

the transport of contaminants in a southerly direction due to the abrupt decline of groundwater contaminant concentrations west of the slab. The presence of the utilities at Building 81 and Building 82 will be considered in the development of the long-term monitoring program portion of the remedial design.

d. This issue was discussed at the BRAC Cleanup Team (BCT) meeting on September 1, 2011 as documented in the minutes of that meeting. Please see the Response to Comments 7 and 8 below for a discussion of soil gas sampling.

Comment 3: *The identification of 11,000 µg/l of PCE in shallow overburden ground water is significant and strongly suggests that vapor intrusion may be an issue at this site given the shallow nature of groundwater. This finding has implications for the CSM, and argues that a more detailed understanding of the source zone architecture and contaminant phase distribution may be beneficial to development of successful remedial strategies in the FS. The finding also suggests that the MNA standalone remedial option offered in the recent submittal entitled "Building 81 Feasibility Study – Proposed Approach" will be insufficient to remediating this site in a reasonable time frame, particularly given the intensive redevelopment efforts proposed for the site. The uncertainties presented by the variability in maximum contaminant concentrations are compounded by uncertainties with respect to future land use (e.g., ground water use for irrigation) and it is highly likely in this light that further carefully considered remedial actions will be needed in order to facilitate reuse and meet cleanup goals in time frames that are reasonable and realistic. Formulation of appropriate risk scenarios and remedial alternatives needs to consider these issues.*

Response: The PCE concentration of 11,000 µg/L was detected in groundwater from shallow bedrock well BR-07, not in shallow overburden groundwater. The concerns noted in this comment will be addressed in the context of the Building 81 FS. They do not impact completion of the final RI.

Comment 7: *EPA does not concur with the change from an 8-hour equilibration time to a 30-minute equilibration time. Consultation with Region 1 experts indicated that even longer equilibration times (e.g. 24 hours) may be advisable. Given the importance of potential vapor intrusion issues with respect to future redevelopment, this issue should be revisited. A focused re-sampling effort is called for. Prior to finalizing on the appropriate approach for the follow-up sampling, a technical consensus is needed.*

Response: As discussed in the September 1, 2011 BCT meeting and documented in the BCT meeting minutes, the soil gas sampling time used during the supplemental RI field program reflected discussions with the EPA RPM, EPA chemists, and other EPA staff in July 2009. The soil gas sampling was performed in accordance with the draft final Building 81 RI Work Plan Addendum, which was accepted by the EPA RPM in an email dated August 12, 2009.

Comment 8: *The original comment and response underscore the need to revisit the soil-gas sampling issue. Given the reported variability in soil vapor conductivity, longer equilibration and sampling times are needed. For this effort, it may be more appropriate to consider a 24-hour equilibration times. In addition to the equilibration time issues, a host of additional technical matters need to be discussed so that technical consensus may be reached regarding best practices for any future soil gas sampling efforts. For example, sub-slab samples may be more representative if a "grab" sample is collected following a longer equilibration time. Similarly, if allowable by water table conditions, a slightly deeper sample interval (i.e., 5 ft bgs) may be advantageous in order to overcome near-surface fluctuations, etc. Further discussions are needed prior to additional soil gas and sub-slab vapor sample collection.*

Response: Please see the Response to Comment 7 above. The Navy will continue to coordinate discussions with the EPA and MassDEP if additional soil gas sampling is performed by Navy.

Comment 11: *The original comment underscored an uncertainty with respect to the CSM which will needs to be examined over time via appropriate monitoring. For example, if 1,-2 DCA does not respond to remedial efforts in the same manner as PCE and related breakdown products, the possibility of an additional source may need to be further investigated.*

Response: Comment noted. Remedial efforts for all contaminants of concern will be described in the Building 81 FS.

Comment 13: *The response suggests that DNAPL is not a significant concern for this site. As previously discussed, the PCE concentration at location BR-07 in 2009 was 11,000 µg/L, which is approximately 5.5% of PCE's solubility in water. In 2006, the PCE concentration at the same location was 4,300 µg/L. This strongly suggests that DNAPL is present at this location, and based on PCE concentrations at other locations in excess of 1% of solubility (MW-3D for example), DNAPL, particularly residual DNAPL, cannot be ruled out at this site. This finding has implications for the CSM, and argues that a more detailed understanding of the source zone architecture and contaminant phase distribution may be beneficial to development of successful remedial strategies in the FS.*

Response: The Navy has not ruled out the potential presence of DNAPL at this site. The remedial alternatives discussed in the FS will account for the potential presence of DNAPL. The Navy's initial response to Comment 13 indicated that text in Section 5.3.1.7 of the draft final RI would be revised to state: "The 2006 and 2009 groundwater data also support the conclusion that PCE and BTEX compounds are co-located and are overwhelmingly hydraulically driven (through advection) from the source area in the overburden." This response is superceded by the following revision to Section 5.3.1.7:

"As discussed in Section 1.4, previous investigations concluded that the presence of DNAPL at the Site is unlikely, based on a variety of factors including: relatively low concentrations of PCE in groundwater relative to its solubility limit; the absence of confining layers that would collect DNAPL; and the co-location and co-solubility of PCE and BTEX, which indicate that the bulk of the source of dissolved PCE originated from the overburden rather than from a pooled source at the bottom of the overburden or within the bedrock.

Some, but not all, of these factors are also supported by the findings of the recent field investigations. The geologic and hydrogeologic evaluations presented in Section 3 concluded that there is no evidence of a confining layer that would collect DNAPL for the following reasons:

- The hydraulic conductivity in the shallow bedrock (i.e. geometric mean) is approximately one order of magnitude lower than in the deep overburden, but this difference does not significantly restrict flow or contaminant transport from the deep overburden to the shallow bedrock;

- While the bedrock is fractured throughout the investigated depth, the fractures transmitting flow are concentrated in shallow bedrock; and

- The shallow bedrock fractures are more interconnected compared to deep bedrock causing contamination to be more dispersed at shallower depths.

While much of the 2006 and 2009-2010 groundwater data support the conclusion that PCE and BTEX compounds are co-located and hydraulically driven (through advection) from the source area in the overburden, the elevated PCE concentrations detected at bedrock wells BR-07 and MW-3D suggest DNAPL may be present in the bedrock and may be a secondary continuing contaminant source. It is generally accepted that if the groundwater concentration of a particular contaminant is 1 to 10 percent of its aqueous solubility, then the groundwater has been in contact with DNAPL along its flow path to the monitoring point. The detected concentration of PCE at BR-07 (2009-2010) represents approximately 5.5 percent of PCE's solubility in water (approximately 2000 µg/L). In 2006, the PCE concentration at MW-3D was in excess of 1 percent of its aqueous solubility but in 2009-2010 the PCE concentration was below 1 percent. These two wells (which are located approximately 40 feet apart and south-southwest of the former tank grave) may be hydraulically connected through vertical or high-angle fractures in the bedrock and through the long boreholes (BR-07 and BR-13) that were drilled in 2000 and remain open. As a result, a DNAPL mass containing chlorinated VOCs and other VOCs including benzene may have migrated into shallow bedrock beneath the source area and then continued to migrate into the deep bedrock in the vicinity of MW-3D via bedrock fractures and/or open boreholes. Because groundwater from only these two locations contained PCE at concentrations exceeding its 1 percent pure phase

solubility, and the extent of the high PCE concentrations in the vicinity of these wells is limited, it appears that the potential DNAPL mass could be small and trapped in fractures. The amount of PCE released at the Site is unknown."

Comment 18: *It is not clear that the response advocating elimination of certain COCs (ethyl benzene, PCE, heptachlor expoxide, naphthalene, chloroform) as possible sources to groundwater contamination is consistent with the CSM for the site. As noted in the original response, several of these compounds (ethyl benzene, PCE, heptachlor epoxide) were found in ground water at concentrations greater than tap-water screening values, suggesting a linkage between soil and groundwater. The Navy's response also notes that 1 of 33 naphthalene samples exceeded the SSL at a DF of 20. It is further noted that the shallow ground water table (2 feet bgs minimum; 6 feet bgs average) needs to be further considered in light of the CSM and potential redevelopment plans. While the Navy notes that remediation of ground water is "more likely than remediation of soils," this is not yet clear and needs to be further evaluated in the FS. In the recent submittal entitled "Building 81 Feasibility Study – Proposed Approach", several phases of previous soil excavations are summarized, including soil related to waste-oil USTs as well as an "area of PAH-contaminated shallow soils". These data support a CSM invoking both localized subsurface as well as surface releases which have impacted ground water. It should be noted that additional soil gas sampling in a vertical profiling mode may be useful in distinguishing different potential sources such as surface vs. subsurface releases. It is also noted that soil excavation efforts have been a reasonably effective tool in mitigating the problem thus far, "These actions removed the bulk of the continuing source of contamination in Site soil and reduced the concentrations of some groundwater contaminants". Further soil actions should certainly not be ruled out at this time.*

As noted in the response to Comments 3 and 13 above, the finding of 11,000 µg/l of PCE in shallow overburden ground water is significant, and approaches values which may be interpreted as indicating the presence of NAPL, most likely residual NAPL, (i.e., sorbed to soil matrix). This is significant in relation to future risk scenarios, since redevelopment efforts are likely to involve disturbance/excavation of soils to depths which may intersect the shallow groundwater (2-6 feet bgs). As such, construction workers may be exposed to contaminants in both the groundwater and residual soil phases. Moreover, the remediation of groundwater may be limited by the effectiveness of a particular remedial technology to access localized pockets of high-concentration residual sorbed to soil. This may explain the limited effectiveness of previous ISCO injections. In any event, further consideration is needed with respect to linkages between soil and ground water contamination, including the likelihood of localized areas of shallow saturated soils containing high levels of sorbed contaminants.

Response: Navy notes that EPA's comment acknowledges the issues should be evaluated in the FS; the Navy will do so. The issues noted in the comment do not impact completion of the final RI.

The maximum concentration of PCE in shallow overburden groundwater is 100 µg/L; this value is the sole PCE concentration over 50 µg/L in shallow overburden groundwater. Concentrations of PCE in the deep overburden are generally higher, with a maximum concentration of 300 µg/L. None of the overburden concentrations are indicative of DNAPL, and the pattern of injection wells in the shallow overburden indicates that the higher concentrations are north of the injection area. Therefore, the high concentrations of PCE (the 11,000 µg/L detected in shallow bedrock) are more likely to be indicative of problems with targeting particular bedrock fractures rather than contaminants sorbed to soil particles.

Letter Comment 10: *The response states that, "there is no surface water at the Building 81 site and therefore no direct exposure pathway". However, it is unclear how the potential migration pathway (Building 81 ground water discharges to B82 surface water) is to be addressed administratively. Table 1 presents an initial screening of B81 shallow ground water values with respect to AWQC, but this initial assessment neglects to consider discharge of deeper groundwater to surface water. As noted above, PCE concentrations of 11,000 µg/l have been detected at the B81 site, and certainly transport pathways of "200 feet" are within the realm of possibility given the many uncertainties at these sites. Clearly this pathway will need to be addressed in the combined remedial programs for the two sites. As stated in previous EPA comments, it is likely that ground water (and surface water) management in the greater B81/82 areas will require a coordinated management approach. Please clarify. Also, please clarify*

whether the large area of phragmites and cat-tails just to the east of the site is a wetland? Is surface water present here at some times of year?

Response: The Navy has previously suggested developing a combined monitoring program for the two sites, as noted in the Response to Comment 1b. The deep overburden and bedrock plumes are characterized downgradient and appear to be stable. Long-term monitoring will be a component of the remedial alternatives in the FS, and is anticipated to be part of any remedial plan for the site. Migration of groundwater from the Building 81 site to the west will be addressed in the Building 82 portion of the monitoring program. There is no delineated wetland 'just to the east of the site.' The nearest delineated wetland is approximately 500 feet east of the site. All runoff from the site flows to the south and southwest and enters the stormwater drainage system; groundwater flow, as indicated by contaminant plume contours and all groundwater flow maps, is toward the west.

Table 4-2: *What are the implications of the lead value (2610 mg/kg) at sample B81-SS-113-0002?*

Response: Sample B81-SS-113-0002 is the surface soil sample collected directly west of the center of the building slab. None of the other detected concentrations of lead in the surface soil samples exceeded the human health or ecological criteria or Base background value. As discussed in the risk assessment, there were no risks identified in surface soils for the potential receptor groups evaluated.

Table 4-4: *As discussed in previous comments, above, the presence of high values of VOCs and PAHs in subsurface soils may represent a persistent residual source of ground water contamination. A number of samples listed in this table (e.g., B81-SO-108-1012; PCE@ 5900 µg/kg) report values which are consistent with this scenario, which argues for a more robust assessment of potential risks as well as a commensurate assessment of remedial alternatives which have the potential to address both groundwater and residual soil contamination.*

Response: The only subsurface soil samples exceeding PRGs were the sample noted in the comment above from 2006 and two samples from 1998 at the bottom of the former tank excavation. As shown in Section 4.3.3.1 of the draft final RI, in the 6-20 feet bgs soil interval the maximum PCE concentration was 5900 µg/kg, as noted in the comment; however PCE was only detected in 30 percent of the samples and the average concentration was 187 µg/kg. The other 79 subsurface soil samples collected in 2006 do not have elevated VOC or PAH levels. The FS will evaluate remedial alternatives based on the data and risks identified in the RI.

Table 4-7a: *The 11,000 µg/l value reported from sample B81-BR-07 is noteworthy in that it is reported from a vertical sampling interval of 33 feet. This suggests the strong possibility of higher concentration interval(s) occurring in thinner zones which may have been diluted in the sample owing to the long sample interval length. This may have implications for the CSM. Discrete interval vertical sampling is recommended here. Further discussions are needed.*

Response: The Navy plans to finalize the RI and proceed with the FS; no further sampling will be performed as part of the RI. As noted in the Response to Comment 13, the remedial alternatives discussed in the FS will account for the potential presence of DNAPL.

TABLE 1

COMPARISON OF MAY 2010 RSLS TO JUNE 2011 RSLs FOR BUILDING 81 COCS

Media	Contaminant	RSL change	Impact
Soil	mercury	value increased	no exceedance of the May 2010 screening value
	thallium	value increased	no exceedance of the May 2010 screening value
	cis-1,2-dichloroethene	value decreased	no exceedance of the May 2010 or June 2011 screening value
	m-xylene	value decreased	no exceedance of the May 2010 or June 2011 screening value
	o-xylene	value decreased	no exceedance of the May 2010 or June 2011 screening value
	1,1-biphenyl	value decreased	no exceedance of the May 2010 or June 2011 screening value
GW	cis-1,2-dichloroethene	value decreased	no exceedance of the May 2010 or June 2011 screening value
	n-butyl benzene	new value	no exceedance of screening value
	o-xylene	value decreased	no exceedance of the May 2010 or June 2011screening value
	p-xylene	value decreased	no exceedance of the May 2010 or June 2011 screening value
	1,1-biphenyl	value decreased	3 new exceedances in deep overburden, 4 in shallow bedrock
	bromochloromethane	new value	no exceedance of screening value
	dichlorodifluoromethane	value decreased	no exceedance of the May 2010 or June 2011 screening value
	m-xylene	value decreased	no exceedance of the May 2010 or June 2011 screening value
	1,4-dioxane	value decreased	2 new exceedances in shallow bedrock, 3 in deep bedrock
	thallium	new value	no exceedance of screening value
Air	m&p-xylene	value decreased	no exceedance of the May 2010 or June 2011 screening value
	o-xylene	value decreased	no exceedance of the May 2010 or June 2011 screening value